

most common central nervous system (CNS) disorder in premature infants younger than 32 weeks' gestation, occurring in 40% to 60% of such children. Ultrasonography can show subependymal, intraventricular or intracerebral germinal matrix hemorrhage in the acute or the convalescent phase.

Serial examinations are helpful for evaluating the progression of hemorrhage, the development and course of post-hemorrhagic hydrocephalus and, in some cases, the development of periventricular leukomalacia or porencephaly. Ultrasonography of periventricular leukomalacia is now considered more accurate and reliable than computed tomography (CT).

Ultrasonography can be helpful in diagnosing CNS malformations such as congenital hydrocephalus, holoprosencephaly, agenesis of the corpus callosum, hydranencephaly, Dandy-Walker cysts, intracerebral tumors and arteriovenous malformations. CT, angiography or both may be necessary for further characterization.

Ultrasonography is also useful in evaluating term neonatal asphyxia, intrauterine and postnatal CNS infections, head trauma and hemorrhage due to coagulopathy, but CT is usually more definitive in such cases. Cerebellar and subarachnoid hemorrhage is difficult to image with ultrasonography because the cerebellum, the subarachnoid space and clotted blood are all echogenic.

Because the anterior fontanelle is the primary window used to examine the brain, a small fontanelle or overlapping skull bones will limit the quality of the examination. Also, the convexities of the cerebral spaces are not adequately visualized from the anterior fontanelle and, therefore, CT is preferable for examining these areas. Subcutaneous emphysema will also limit or preclude ultrasonography of the brain.

Ultrasonography has proved useful for diagnosing and following various neonatal brain disorders. And it can be used on infants whose condition is too unstable for them to be examined by other methods.

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Percutaneous Removal of Renal and Ureteral Stones

PERCUTANEOUS REMOVAL of symptomatic renal and ureteral calculi is now a routine radiologic method that has replaced open stone operations in the vast majority of patients. Not only simple renal pelvic stones but also calyceal, ureteral and staghorn calculi can be managed successfully percutaneously.

Assessing a patient's blood coagulating properties and obtaining informed consent are part of the routine preprocedure workup. Pretreating with antibiotics is important in patients with a history or symptoms of urinary tract infection. Carefully evaluating the patient's renal anatomy based on previously taken intravenous urograms is essential for planning the optimal access route. We do dilations up to 24 or larger French sizes as a single-step procedure using epidural anesthesia. With the aid of fluoroscopy or endoscopy, stones are

removed using baskets, grasping forceps or by ultrasonic lithotripsy. A nephrostomy tube is left in the renal pelvis for at least 24 to 48 hours. It is removed when residual stone fragments have been excluded and good antegrade flow of urine has been confirmed. Hospital stays range from three to seven days in uncomplicated cases, but may be as long as two to three weeks in patients with staghorn calculi or many calyceal stones. Close cooperation between the radiologist and urologist has proved helpful for optimal patient management.

The success rate for percutaneous removal of kidney stones is 95% and for removal of ureteral stones it is about 90%. Occasional stone fragments left behind are usually small and asymptomatic.

Major complications occur in less than 5% of patients. They include hemorrhage, which is usually well controlled by blood transfusions and balloon tamponade and rarely requires angiographic embolization. A surgical procedure and nephrectomy are extremely rare complications. Urosepsis occurs in less than 1% of patients and responds readily to antibiotic treatment, provided there is good urinary drainage.

The advantages of percutaneous stone removal over surgical nephrolithotomy or ureterolithotomy are lower morbidity, shorter hospital stay, shorter recovery period and reduced cost.

A new technique for renal stone removal is extracorporeal shock wave lithotripsy. This is a noninvasive method that uses focused ultrasound waves to fragment stones. Its overall success rate approaches 90%. Percutaneous nephrostomy with tract dilatation is the method of choice in the other 10% of patients. Furthermore, percutaneous or retrograde manipulations of the genitourinary tract are required in 8% or 9% of patients who are treated with this technique to relieve ureteral obstruction resulting from passing stone fragments.

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Ultrasonography in the Operating Room

RECENT TECHNICAL ADVANCES in instrumentation have led to diverse and innovative applications of ultrasonography including its use in the operating room. High-resolution real-time ultrasound units that are portable with scan heads that are relatively small and easily maneuvered have greatly increased the number of uses of sonography in the operating room. The ultrasound probes are placed directly onto the operative field after the probe is enclosed in sterile coverings. In this way, real-time imaging of the operative site provides a surgeon with immediate information before, during or after the operation.

One of the original and now well-established uses of intraoperative ultrasound is in the neurosurgical suite. There are three main applications of intraoperative ultrasonography in neurosurgery: guiding a shunt tube placement, brain biopsy and spinal cord operations. Sonographic monitoring of shunt tube placement allows correct positioning and alleviates pos-